ELSEVIER

Nuclear Instruments and Methods in Physics Research A 358 (1995) xvii–xxvi

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH Section A

Contents

Preface vii
1994 Free Electron Laser Prize ix
Committees x
Photos xi

Part I. Full length papers

Section I. Compact FELs

Advanced technologies for a compact rf linac FEL
D.C. Nguyen 3
Free electron micro-lasers
C.M. Tang, M. Goldstein, T.A. Swyden and J.E. Walsh 7
A superlattice as an undulator
Yu.A. Malov and D.F. Zaretsky 11
Compact high-brightness radiation sources
J. Chen, K. Imasaki, M. Fujita, M. Asakawa, T. Asakuma, S. Nakai and C. Yamanaka 14
A path towards a compact, CW FEL using superconducting rf accelerator technology
J. Edighoffer, K.-J. Kim, M. Xie, F. Dylla, R. Sheffield and S. Chattopadhyay 18
A compact, bright and tunable CW source of soft X-rays
I. Kimel and L.R. Elias 20
Preliminary emission characteristic measurements for a $300k FIR FEL
J.W. Lewellen, J.F. Schmerge, Y.C. Huang, J. Feinstein and R.H. Pantell 24
Recent progress of the compact AFEL at Los Alamos
D.C. Nguyen, S.M. Gierman, J.C. Goldstein, J.M. Kinross-Wright, S.H. Kong, J.G. Plato, S.J. Russell, R.L. Sheffield, F.E. Sigler, B.A. Sherwood, M.E. Weber and C. Ziomek 27

Section II. Single pass UV/X-ray FELs

UV/X-ray free electron lasers through high-gain single pass amplifiers: basic principles and key issues
K.-J. Kim 31
High-brightness rf photocathode guns for single pass X-ray free-electron lasers
P.G. O'Shea 36
Electron beam acceleration and compression for short wavelength FELs
T.O. Raubenheimer 40
Undulators for short wavelength FEL amplifiers
R.D. Schlueter 44
Performance simulation and parameter optimization for high gain short wavelength FEL amplifiers
G. Travish 48
Milestone experiments for single pass UV/X-ray FELs
I. Ben-Zvi 52
Particle beam modulation techniques for the generation of subfemtosecond photon pulses in the VUV/soft X-ray range
R. Tatchyn 56

0168-9002/95/$09.50 © 1995 – Elsevier Science B.V. All rights reserved

Parametric study of an X-ray FEL
G. Travish, W.M. Fawley, K.-J. Kim, H.-D. Nuhn, C. Pellegrini, H. Winick and M. Xie 60
Multisectional FELs with dispersion and undulator sections
V.A. Bazylev and M.M. Pitatelev 64
Simulations of a klystron undulator for the SLAC X-ray FEL
G.H. Winter, J. Hall, R.K. Wong and W.B. Colson 68
Mock-up of the focusing undulator for the SLAC X-ray FEL project
A.A. Varfolomeev, V.V. Gubankov, A.H. Hairetdinov, S.N. Ivanchenkov, A.S. Khlebnikov, N.S. Osmanov and S.V. Tolmachev 70

Section III. Prebunched beams and coherence

Coherent spontaneous emission in FELIX
D. Oepts, D.A. Jaroszynski, H.H. Weits and P.W. van Amersfoort 72
Femtosecond deep UV pulse by high gain harmonic generation from a chirped seed
L.H. Yu 74
Coherence effects in FEL radiation generated by short electron bunches
G.P. Gallerano, A. Doria, E. Giovenale and G. Messina 78
Free electron maser experiment with a prebunched beam
M. Cohen, A. Kugel, D. Chairman, M. Arbel, H. Kleinman, D. Ben-Haim, A. Eichenbaum, M. Draznin, Y. Pinhasi, I. Yakover and A. Gover 82
Mode-locked super-radiant free-electron laser oscillator
Y. Pinhasi and A. Gover 86
Simulation of radiation build-up in an FEL oscillator: the effect of the electron beam micropulse shape
S. Kuruma, K. Mima, K. Imasaki, S. Nakai and C. Yamanaka 90
Finite pulse effects in self-amplified-spontaneous-emission
K.-J. Kim and S.J. Hahn 93

Section IV. Long wavelength

Turbulent FEL theory and experiment on ELSA at Bruyeres-le-Chatel
P. Chaix and P. Guimbal 96
A Cherenkov free electron laser with high peak power
P.J.M. van der Slot, J. Couperus, W.J. Witteman, A.N. Lebedev, E.G. Krastelev, A.V. Agafonov, V.S. Voronin and V.A. Krasnopolsky 100
Amplifier performance of the NRL ubitron
D.E. Pershing, R.D. Seeley, R.H. Jackson and H.P. Freund 104
The groove guide as an interaction structure for a microwave FEL
P. Arcioni, M. Bressan, F. Broggi, G. Conciauro, L. Perregrini and P. Pierini 108
Ribbon-FEL experiments at one-dimension distributed feedback
A.V. Arzhannikov, V.B. Bobylev, S.L. Sinitsky, A.V. Tarasov, N.S. Ginzburg and N.Yu. Peskov . . . 112
Analysis of chaotic behaviour in a Raman FEL
S. Kawasaki, H. Ishizuka, T. Koarai, A. Watanabe and M. Shiho 114
Strong coupling operation of a FEL amplifier with an axial magnetic field
J.L. Rullier, J. Gardelle, J. Labrouche and P. Le Taillandier 118
Experimental results on the 1.5 MeV ion-channel guided X-band free-electron laser
K. Takayama, J. Kishiro, K. Ebihara, T. Ozaki, S. Hiramatsu and H. Katoh 122
Experimental study of the spatial evolution of the spectrum of a Raman FEL
P. Zambon, W.J. Witteman and P.J.M. van der Slot 126
A microwave inverse free-electron-laser accelerator (MIFELA)
J.L. Hirshfield, T.C. Marshall, T.B. Zhang, A.K. Ganguly and P.A. Sprangle 129

Experimental mode analysis of the circular free electron laser
T. Mizuno, T. Ootuki, T. Ohshima and H. Saito 131
Concept of a submillimeter wavelength CARM
V.L. Bratman, G.G. Denisov, M.M. Ofitserov, M.I. Petelin and S.V. Samsonov 135
Theory of the free-electron laser based upon a coaxial hybrid wiggler
H.P. Freund, R.H. Jackson, D.E. Pershing and J.M. Taccetti 139
Cyclotron resonance maser experiment in a non-dispersive waveguide
A. Shahadi, E. Jerby, M. Korol, R. Drori, M. Sheinin, V. Dikhtiar, V. Grinberg, I. Ruvinsky, M. Bensal, T. Harhel, Y. Baron, A. Fruchtman, V.L. Granatstein and G. Bekefi 143
Green function analysis of a Raman FEL
G. Shvets and J.S. Wurtele 147
Free-electron maser oscillator experiment in the UHF regime
R. Drori, E. Jerby and A. Shahadi 151

Section V. High power

A 130–260 GHz, 1 MW free electron maser for fusion
W.H. Urbanus, W.A. Bongers, G. van Dijk, C.A.J. van der Geer, J.P. van Ieperen, A. van der Linden, P. Manintveld, A.B. Sterk, A.V. Tulupov, A.G.A. Verhoeven, M.J. van der Wiel, V.L. Bratman, G.G. Denisov, A.A. Varfolomeev, S.N. Ivanchenkov, A.S. Khlebnikov, M. Catellino, A. Salop and M. Caplan 155
CEBAF UV/IR FEL subsystem testing and validation program
G.R. Neil, S.V. Benson, H.F. Dylla and H. Liu 159
Design study of a G-band FEL amplifier for application to cyclotron resonant heating in magnetic fusion reactors
H.P. Freund, M.E. Read, R.H. Jackson, D.E. Pershing and J.M. Taccetti 163
Time-dependent multi-dimensional simulation studies of the electron output scheme for high power FELs
S.J. Hahn, W.M. Fawley, K.-J. Kim and J.A. Edighoffer 167
Chaotic particle deceleration and FEL efficiency enhancement with an incoherent pump wave or a stochastic undulator
Ya.L. Bogomolov, N.S. Ginzburg and E.R. Golubyatnikova 171
Predicted operating conditions for maintaining mode purity in the 1 MW 200 GHz FOM free electron maser
M. Caplan, T. Antonsen, B. Levush, A. Tulupov and W. Urbanus 174
Spectral dynamics of the FEM
P.J. Eecen, A.V. Tulupov and T.J. Schep 178
Competition of longitudinal modes and the scenario of single-mode regime build-up for the FOM-Fusion-FEM project
V.L. Bratman and A.V. Savilov 182
Electrostatic-accelerator FELs for power beaming
I. Kimel and L.R. Elias 186
Super-power free electron lasers with two-dimensional distributed feedback
N.S. Ginzburg, N.Yu. Peskov, A.S. Sergeev, A.V. Arzhannikov and S.L. Sinitsky 189
Design and performance calculations for a K_a-band CHI wiggler ubitron amplifier
J.M. Taccetti, R.H. Jackson, H.P. Freund, D.E. Pershing, M. Blank and V.L. Granatstein 193
Beam transport through undulators designed for high power FEMs
A.A. Varfolomeev and A.V. Smirnov 197
High power operation of a wiggler-focused sheet beam free electron laser amplifier
S. Cheng and W.W. Destler 200
Free-ion lasers with radiative ion cooling
E.G. Bessonov 204

Section VI. FEL experiments

Time-resolved study of sideband generation and transition to chaos on an infrared FEL
W.P. Leemans, M.E. Conde, R. Govil, B. van der Geer, M. de Loos, H.A. Schwettman, T.I. Smith and R.L. Swent 208

Sub-picosecond laser pulse generation on the CLIO FEL
R. Prazeres, J.M. Berset, F. Glotin, D. Jaroszynski and J.M. Ortega 212

Sub-picosecond FEL micropulse length and electron bunch measurements
E.R. Crosson, K.W. Berryman, T.I. Smith, R.L. Swent, H.C. Lihn and H. Wiedemann 216

Observation and characterization of frequency-chirped optical pulses on the Mark III free-electron laser
E.B. Szarmes, A.D. Madden and J.M.J. Madey 220

Two-colour operation of the free-electron laser using a step-tapered undulator
D.A. Jaroszynski, R. Prazeres, F. Glotin and J.M. Ortega 224

Free-electron laser operation and self-amplified spontaneous emission using a step-tapered undulator
D.A. Jaroszynski, R. Prazeres, F. Glotin, J.M. Ortega, D. Oepts, A.F.G. van der Meer, G. Knippels and P.W. van Amersfoort 228

Electron energy spectral measurements in the large-slippage regime
W.A. Gillespie, A.M. MacLeod, P.F. Martin, G.M.H. Knippels, A.F.G. van der Meer, E.H. Haselhoff and P.W. van Amersfoort 232

Experimental measurement of short pulse guiding effects in a free-electron laser
B.A. Richman, B. McVey and J.M.J. Madey 236

High efficiency results at 23 μm on the ELSA FEL and operation with the MONA wiggler
Ph. Guimbal, D. Iracane, S. Joly, P. Balleyguier, A. Binet, J.P. Blésès, J. DiCrescenzo, V. Fontenay, P. Fourdin, G. Haouat, J.G. Marmouget, Y. Pranal, F. Sabary, S. Striby and D. Touati 240

Free-electron laser oscillation with a multibunch electron beam of the 38 MeV L-band linear accelerator at ISIR
S. Okuda, Y. Honda, N. Kimura, J. Ohkuma, T. Yamamoto, S. Suemine, T. Okada, S. Ishida, T. Yamamoto, S. Takeda, K. Tsumori and T. Hori 244

Single-bunch and multibunch electron beam generation for FEL experiments with the 38 MeV L-band linear accelerator at ISIR
S. Okuda, Y. Honda, N. Kimura, J. Ohkuma, T. Yamamoto, S. Suemine, T. Okada, S. Takeda, K. Tsumori and T. Hori 248

Wavelength shifting in the Stanford FEL
A. Marziali, T.I. Smith and H.A. Schwettman 252

The saturation of the Beijing FEL
J. Xie, J. Zhuang, Y. Huang, Y. Li, S. Lin, R. Ying, Y. Zhong, L. Zhang, G. Wu, Y. Zhang, C. Chao, L. Li, E. Fu, J. Su, Y. Wang and G. Wang 256

Section VII. FEL technology

FEL cavity length measurement with an external laser
K.W. Berryman, P. Haar and B.A. Richman 260

Phase space tomography of relativistic electron beams
C.B. McKee, P.G. O'Shea and J.M.J. Madey 264

Temporal characterization of the Stanford mid-IR FEL micropulses by "FROG"
B.A. Richman, K.W. DeLong and R. Trebino 268

Photocathodes for free electron lasers
S.H. Kong, J. Kinross-Wright, D.C. Nguyen and R.L. Sheffield 272

Fabrication and characterization of cesium telluride photocathodes: A promising electron source for the Los Alamos Advanced FEL
S.H. Kong, D.C. Nguyen, R.L. Sheffield and B.A. Sherwood 276

Photoemission studies on LaB_6 and pure metals using a nanosecond KrF excimer laser
M.-q. Qian, M.-r. Yang, Q. Pan, K.-s. Hu, R.-p. Deng, J.-j. Shi, Z.-c. Tao, J.-b. Cheng, Q.-j. Ran and Z.-l. Lin 280

Performance of cesium telluride photocathodes as an electron source for the Los Alamos Advanced FEL
S.H. Kong, J. Kinross-Wright, D.C. Nguyen, R.L. Sheffield and M.E. Weber 284

On the use of CsK_2Sb photocathodes in RF linacs
B.M. van Oerle and G.J. Ernst 287

Laser cooling of an electron beam by the coherent scattering of a strong laser beam
T. Taguchi and K. Mima 291

Visualization of spatial profiles of spectra and intensities in FEL simulations
K. Yoshikawa, T. Shinzato, Y. Yamamoto, M. Ohnishi and T. Yamazaki 295

FEL center user diagnostics and control
K.W. Berryman, B.A. Richman, H.A. Schwettman, T.I. Smith and R.L. Swent 300

The influence of hole-coupling on the transverse structure of intra-cavity light pulses
G.H.C. van Werkhoven, B. Faatz and T.J. Schep 304

Influence of the radial mode structure on the losses in the FELIX hole-coupled resonators
G.M.H. Knippels, G.H.C. van Werkhoven, E.H. Haselhoff, B. Faatz, D. Oepts and P.W. van Amersfoort 308

Hole coupling experiments on the Mark III FEL
G.A. Barnett, S.V. Benson, J.M.J. Madey and E.B. Szarmes 311

Maximization of FEL gain for a hole-coupled resonator
Y.C. Huang, R.H. Pantell, J.F. Schmerge and J. Feinstein 315

Pulse stacking in the SCA/FEL external cavity
P. Haar, H.A. Schwettman and T.I. Smith 319

Resonator design and characterization for the Israeli tandem electrostatic FEL project
I.M. Yakover, Y. Pinhasi and A. Gover 323

Low-cost electron-gun pulser for table-top maser experiments
V. Grinberg, E. Jerby and A. Shahadi 327

First operation and perspectives of the superconducting linac LISA
M. Castellano, M. Ferrario, M. Minestrini, P. Patteri, F. Tazzioli, F. Cevenini and L. Catani 331

Section VIII. Storage ring FELs

Giant laser pulses in the Duke storage ring UV FEL
V.N. Litvinenko, B. Burnham, J.M.J. Madey and Y. Wu 334

Theory of the longitudinal dynamics of a storage ring FEL
G. Dattoli, L. Giannessi and A. Renieri 338

Dynamic behavior of the Super-ACO FEL micropulse
T. Hara, M.E. Couprie, A. Delboulbé, D. Garzella, L. Nahon and M. Billardon 341

mm-wave isochronous FEL and hard X-ray inverse Compton source at the Duke storage ring
V.N. Litvinenko, Y. Wu, B. Burnham, G. Barnett and J.M.J. Madey 345

Expected performance of the mm-wave isochronous FEL at the Duke storage ring
V.N. Litvinenko, Y. Wu, B. Burnham and J.M.J. Madey 349

Lasing in the ultraviolet region with the NIJI-IV storage-ring free-electron laser
T. Yamazaki, K. Yamada, N. Sei, H. Ohgaki, S. Sugiyama, T. Mikado, R. Suzuki, T. Noguchi, M. Chiwaki, T. Ohdaira, M. Kawai, M. Yokoyama, S. Hamada and A. Iwata 353

Expected performance of FELINA, the Dutch VUV-FEL in Amsterdam
R.J. Bakker, R. Maas, G. Luijckx, V.N. Litvinenko, B. Faatz and P.W. van Amersfoort 358

The barrel shaped resonator for the photon storage ring
A.I. Kleev, A.B. Manenkov and H. Yamada 362

Observation of micro–macro temporal structure and saturation mechanism on the UVSOR free electron laser
H. Hama, J. Yamazaki, T. Kinoshita, K. Kimura and G. Isoyama 365
Dynamics of the Duke storage ring UV FEL
V.N. Litvinenko, B. Burnham, J.M.J. Madey and Y. Wu 369
A longitudinal feedback for the Super-ACO free electron laser stability in the UV
M.E. Couprie, D. Garzella, T. Hara, J.H. Codarbox and M. Billardon 374
Effects of an optical klystron on the electron beam of the storage ring NIJI-IV for free-electron lasers
M. Yokoyama, N. Sei, M. Kawai, K. Yamada, S. Hamada, S. Sugiyama, H. Ohgaki, T. Mikado, T. Noguchi, R. Suzuki, M. Chiwaki and T. Yamazaki 378
Optical cavities for UV free electron lasers
M.E. Couprie, D. Garzella and M. Billardon 382
Mirror degradation and heating in storage ring FELs
D. Garzella, M.E. Couprie, T. Hara, L. Nahon, M. Brazuna, A. Delboulbé and M. Billardon 387
Degradation and restoration of dielectric-coated cavity mirrors in the NIJI-IV FEL
K. Yamada, T. Yamazaki, N. Sei, T. Shimizu, R. Suzuki, T. Ohdaira, M. Kawai, M. Yokoyama, S. Hamada, K. Saeki, E. Nishimura, T. Mikado, T. Noguchi, S. Sugiyama, M. Chiwaki, H. Ohgaki and T. Tomimasu 392

Section IX. Wigglers and undulators

Magnetic field full test of two-section KIAE-4 undulator
A.A. Varfolomeev, Yu.P. Bouzouloukov, S.N. Ivanchenkov, A.S. Khlebnikov, N.S. Osmanov, S.V. Tolmachev, W.H. Urbanus and M.J. van der Wiel 396
Development of a modified wiggler for higher harmonic lasing of a free-electron laser
M. Asakawa, N. Inoue, K. Mima, S. Nakai, K. Imasaki, M. Fujita, J. Chen, C. Yamanaka, N. Nakao, T. Agari, T. Asakuma, A. Moon, N. Ohigashi, T. Minamiguchi and Y. Tsunawaki 399
Performance of the undulator for JAERI FEL project
R. Nagai, H. Kobayashi, S. Sasaki, M. Sawamura, M. Sugimoto, R. Kato, N. Kikuzawa, M. Ohkubo, E. Minehara, T. Ikehata and H. Mase 403
Development of a short-period hybrid wiggler
F. Inoue, N. Ikeda, K. Okubo, M. Takahashi and T. Yamanaka 407
Magnetic field measurements of the harmonic generation FEL superconducting undulator at BNL-NSLS
L. Solomon, W.S. Graves and I. Lehrman 411
End fields in the harmonic generation superconducting FEL at BNL-NSLS
W.S. Graves, L. Solomon and I. Lehrman 414
Betatron oscillations, undulator acceptance and beam conditioning ($\beta_{\parallel}(r) = \text{const.}$) taking space charge effects into account
V.A. Papadichev 418
Electron trajectories in a helical wiggler with a uniform axial guide field: a comparison of numerical results with results obtained using an approximate but analytical method
J.T. Donohue, Ph. Gouard and J.L. Rullier 422
Focusing properties of an undulator with anharmonic magnetic fields
A.A. Varfolomeev and A.H. Hairetdinov 426
Fourier analysis for the rapid calculation of distorted undulator orbits and their correction
V.A. Papadichev 429

Section X. Theory, conjecture, and speculation

On the possibility of the construction of plasma undulators
V. Bazylev, V. Goloviznin, M.M. Pitatelev, A. Tulupov and T. Schep 433
Free electron lasers with static and dynamic plasma wigglers
N.I. Karbushev 437

Ultra-short pulse free electron laser oscillators
J. Blau, R.K. Wong and W.B. Colson 441
Stimulated radiation from an electron beam traversing an inhomogeneous electromagnetic wave
A.V. Koltsov and A.V. Serov 444
Self-oscillations and chaos of free-electron laser oscillators with space charge effects
E.H. Park, J.K. Lee and T.H. Chung 448
Features of operation of a FEL with reversed guide field
A.A. Silivra and I.A. Goncharov 452
A proposal for the generation of ultra-short X-ray pulses
A.A. Zholents and M.S. Zolotorev 455
High power self-similar radiation pulse in a free electron laser
T.B. Zhang and T.C. Marshall 459
3D simulations on output power fluctuation in a short bunch rf-linac FEL
Y. Sentoku, H. Furukawa, K. Mima, T. Taguchi, S. Kuruma, H. Yasuda, C. Yamanaka and S. Nakai . 463
Higher harmonic generation in a FEL with an axisymmetric undulator of the induction type
N.I. Karbushev, V.D. Sazhin and P.V. Mironov 467
Nonlinear evolution of the equilibrium electron orbits in a helical wiggler with a positive axial guide magnetic field at magnetoresonance
J. Yu and W.A. Gillespie 471
Free gas bubbles acoustic laser
S.T. Zavtrak 473
Modeling of space charge dominated performance of the CEBAF FEL injector
H. Liu, J. Benesch, S. Benson, J. Bisognano, D. Douglas, G. Neil, D. Neuffer, C. Sinclair and B. Yunn 475
Nonlinear wave processes during the propagation of a high-current electron beam in an ion-beam undulator
Yu.Ya. Golub and N.E. Rozanov 479
FEL gain calculation for imperfectly matched electron beams
R.L. Swent and K.W. Berryman 482
Non-linear macroscopic equations for pulse evolution in a high-gain Compton FEL
G.H.C. van Werkhoven and T.J. Schep 485
Computationally efficient spectral analysis of an FEL oscillator using a Green function analysis
S. Ishii, G. Shvets and J.S. Wurtele 489
Formation of distributed feedback in an FEL under multi-wave diffraction
V.G. Baryshevsky, K.G. Batrakov and I.Ya. Dubovskaya 493
A re-examination of scaling laws in the traveling wave interaction
H.P. Freund 497
Theoretical investigation of a waveguide application in a FEL with large μ_c
V.I. Zhulin 501
The interaction between low- and high-frequency waves in a waveguide free-electron laser amplifier
W.J. Golightly and S.K. Ride 504
Visible surface quasi-Cherenkov FEL
V.G. Baryshevsky, K.G. Batrakov, I.Ya. Dubovskaya and S. Sytova 508
Optimization of the free electron laser interaction via electron bunch trapping
A.A. Silivra, E.D. Belyavskiy and I.A. Goncharov 512
1-D free-electron laser model without the slowly-varying approximation
C.-B. Kim, Y.-W. Uhm and J.-K. Lee 516
A computer model of the energy–current loss instabilities in a recirculating accelerator system
J.A. Edighoffer and K.-J. Kim 519

POP experiments of the photon–e-beam interaction in the supercavity
M. Fujita, T. Asakuma, J. Chen, K. Imasaki, C. Yamanaka, M. Asakawa, N. Inoue, K. Mima, S. Nakai, T. Agari, N. Nakao, A. Moon, N. Ohigashi, T. Minamiguchi and Y. Tsunawaki 524
Problems of autobunching and phase stability for the TBA-driver: calculations and design for a modeling experiment
G.G. Denisov, V.L. Bratman, A.K. Krasnykh, E.A. Perelstein, A.V. Savilov, A.S. Sergeev and A.P. Sumbaev 528

Section XI. State of FELs, challenges and requirements

Status of free electron lasers in 1994
W.B. Colson 532
Materials science in the far-IR with electrostatic based FELs
S.J. Allen, K. Craig, B. Galdrikian, J.N. Heyman, J.P. Kaminski, J.S. Scott, M.S. Sherwin, K. Unterrainer, M. Wanke, K. Campman, P.F. Hopkins, A.C. Gossard, D.H. Chow, M. Lui and T.K. Liu 536
Vibrational dynamics in condensed matter probed with linac based FELs
A. Tokmakoff, A. Kowk, R. Urhdal, D.A. Zimdars and M.D. Fayer 540
Scientific opportunities for FEL amplifier based VUV and X-ray research
E.D. Johnson 544

Part II. Extended synopses

1-D simulation model of an FEL with a plasma background
T.H. Chung and J.K. Lee . . . . . ABS 3
Status of the Grumman Compact Infrared FEL
I.S. Lehrman, J. Krishnaswamy, R.A. Hartley, R. Bohanick and M.F. Reusch . . . . . ABS 5
The Israeli tandem electrostatic accelerator FEL – status report
A. Arensburg, M. Cohen, M. Draznin, A. Eichenbaum, A. Gover, Y. Pinhasi, V. Shternghartz, I.M. Yakover, J. Sokolovsky, B. Mandelbaum, A. Rosenberg, J. Shiloh, G. Hasak, L.A. Levin, O. Shahal, M. Shapira and V. Granatstein . . . . . ABS 7
Application of a mm-wave free electron laser to the study of high-T_c superconductors
E. Giovenale, V. Boffa, P. Dore, A. Doria, G.P. Gallerano, M.F. Kimmitt, R. Trippetti and I. Spassovsky . . . . . ABS 9
Commissioning the FELI linac and IR-FEL facilities
T. Tomimasu, Y. Morii, E. Ohshita, S. Abe, S. Nishihara, A. Koga, Y. Miyauchi, A. Zakou, E. Nishimura, K. Saeki, A. Kobayashi, M. Yasumoto, E. Tongu and A. Nagai . . . . . ABS 11
Status of the Stuttgart Raman free-electron laser project
G. Renz and G. Spindler . . . . . ABS 13
The optical resonator for the FELICITA I experiment
D. Nölle, A. Geisler, M. Ridder, C. Schellnock, T. Schmidt, S. Tammen and K. Wille . . . . . ABS 14
Magnetic measurements of the electromagnetic undulator for the FELICITA I experiment
M. Ridder, A. Geisler, D. Nölle, T. Schmidt and S. Suermann . . . . . ABS 16
Enhanced harmonic generation from a focussing two-period undulator
A.V. Tulupov . . . . . ABS 18
Improved electron beam transport and diagnosis system for the Darmstadt IR-FEL
H. Genz, H.-D. Gräf, R. Hahn, D.A. Jaroszynski, H. Loos, A. Richter, M. Reichenbach, V. Schlott, M. Thomas, J. Töpper, T. Wesp and M. Wiencken . . . . . ABS 20
Upgrade of the ENEA compact FEL in the sub-mm region
E. Giovenale, F. Ciocci, A. Doria, G.P. Gallerano, M.F. Kimmitt, G. Messina, P. Raimondi, A. Renieri and I. Spassovsky . . . . . ABS 22
Design of a far infrared FEL with an electromagnetic wiggler
V.L. Granatstein, A.W. Fliflet, W.M. Manheimer and A. Gover . . . . . ABS 24

Frequency response to an electron energy shift
R.K. Wong and W.B. Colson . . . . . ABS 26
Slicing single micropulses at FELIX
E.H. Haselhoff, G.M.H. Knippels and P.W. van Amersfoort . . . . . ABS 28
Status of the JAERI free electron laser facility driven by a superconducting rf linac
E.J. Minehara, R. Nagai, M. Sawamura, M. Takao, M. Sugimoto, S. Sasaki, M. Ohkubo, N. Kikuzawa, J. Sasabe, Y. Suzuki, Y. Kawarasaki and N. Shikazono . . . . . ABS 30
Characterization of the mid-IR FEL at Stanford
B.A. Richman, E.R. Crosson, R.L. Swent, H.A. Schwettman and T.I. Smith . . . . . ABS 32
High gradient linac for compact FELs
P. Raimondi and G. Messina . . . . . ABS 34
Numerical simulation studies of the design and performance of the AFEL for high average power operation
J.C. Goldstein, H. Takeda and D.C. Nguyen . . . . . ABS 36
Design of the pseudospark discharge for a Raman FEL
M.C. Wang, J. Zhu, Z. Wang, J.K. Lee and T.H. Chung . . . . . ABS 38
Demonstration of micropulse energy enhancement with the SCA/FEL external cavity system
P. Haar, H.A. Schwettman and T.I. Smith . . . . . ABS 40
A new inductive acceleration structure with multiple electrodes for an FEL
S. Kawasaki, H. Ishizuka, A. Watanabe, Y. Yamashita, A. Tokuti, S. Nakajima, J. Kishiro, K. Takayama and M. Shiho . . . . . ABS 42
Simulations of the Stanford FIREFLY 1 kW free electron laser
D.W. Small, R.K. Wong, J. Blau and W.B. Colson . . . . . ABS 44
Improved wire deflection method for magnetic field measurements in long undulators
A.A. Varfolomeev, A.S. Khlebnikov, N.S. Osmanov and S.V. Tolmachev . . . . . ABS 46
Conceptual design of a compact Compton backscatter X-ray source tunable from 3 to 33 keV
D.C. Nguyen, S.M. Gierman, W. Vernon and R.L. Sheffield . . . . . ABS 48
Three dimensional simulation of an FEL amplifier with an axial field
A. Srivastava, L.M. Bali, T.P. Pandya, P. Jha and R.K. Shukla . . . . . ABS 50
Wiggler-free FEL with an intense helical beam
K.H. Yeom, J.K. Lee and T.H. Chung . . . . . ABS 52
Carbon fiber electron injector for free-electron maser experiments
M. Korol, E. Jerby, S. Eckhouse, M. Bensal and A. Shahadi . . . . . ABS 54
Optical cavity and transport system for FELI
K. Saeki, E. Nishimura, A. Kobayashi, S. Abe, A. Zako, M. Yasumoto and T. Tomimasu . . . ABS 56
Wavelength and power stability measurements of the Stanford SCA/FEL
B. van der Geer, M.J. de Loos, M.E. Conde and W.P. Leemans . . . . . ABS 59
The effects of high gain in an FEL optical klystron
E. Kelsey, J. Blau, D.D. Quick, R.K. Wong and W.B. Colson . . . . . ABS 61
Formation and diagnostics of electron beams for micro-FELs
H. Ishizuka, S. Musyoki, K. Sakamoto, A. Watanabe, M. Shiho and S. Kawasaki . . . . . ABS 63
A comparison between two kinds of chromatic coherent light sources
W. Ding, X. Shu and X. Du . . . . . ABS 65
An FEL design code running on Mathcad™
D.C. Nguyen, S.M. Gierman and P.G. O'Shea . . . . . ABS 67
The ultra-relativistic FEL near the threshold of stimulated emission
V.V. Ognivenko and V.I. Kurilko . . . . . ABS 69
Simple theory of simultaneous harmonics operation of an FEL
B.A. Richman . . . . . ABS 71

RF systems for JAERI FEL linac
M. Sawamura, E.J. Minehara, R. Nagai, M. Sugimoto, M. Takao, R. Kato, N. Kikuzawa and M. Ohkubo . . . . . ABS 73
The UCLA high gain infrared FEL
G. Travish, M. Hogan, C. Pellegrini and J. Rosenzweig . . . . . ABS 75
Performance of the optical cavity control system for the JAERI FEL project
R. Kato, M. Sugimoto, R. Nagai, M. Sawamura, M. Takao, N. Kikuzawa, M. Ohkubo, E.J. Minehara and Y. Suzuki . . . . . ABS 77
A new method of equalizing $\beta_{\|}$ (conditioning) in an electron beam propagating in a longitudinal magnetic field
V.A. Papadichev . . . . . ABS 79
Power requirements for high-average power FELs
R.A. Lyon and W.B. Colson . . . . . ABS 81
Operator supports for the JAERI FEL
M. Sugimoto, R. Nagai, R. Kato, M. Sawamura, M. Takao, N. Kikuzawa, M. Ohkubo and E.J. Minehara . . . . . ABS 83
The ''TEUFEL'' undulator
J.W.J. Verschuur, G.J. Ernst and W.J. Witteman . . . . . ABS 85
Low-level RF control for the AFEL
C.D. Ziomek, J.M. Kinross-Wright and J.G. Plato . . . . . ABS 87
Electron beam diagnostics for an FEL using optical transition radiation
E. Nishimura, K. Saeki, T. Tomimasu, T. Sakai, S. Okuda and J. Ohkuma . . . . . ABS 89
Development of the quasi non-destructive electron beam diagnostic method and the measurement of beam emittance
T. Sakai, T. Yamamoto, S. Okuda, J. Ohkuma, E. Nishimura, K. Saeki, A. Kobayashi and T. Tomimasu . . . . . ABS 91
A flexible far-infrared FEL user facility
K.W. Berryman and T.I. Smith . . . . . ABS 93

Part III. Tables of operating and proposed FELs

Long wavelength free electron lasers in 1994
H.P. Freund and V.L. Granatstein 551
Short wavelength free electron lasers in 1994
W.B. Colson 555

Author index 559